

PIPING INSPECTION

PRD041

COURSE DESCRIPTION

Piping Systems are interconnected piping subject to the same set or sets of design conditions. Piping refers to assemblies of piping components used to convey fluids.

Pipeline Integrity Management is a hot bed of discussion these days. It is because many transmission pipelines are now over 20 years old and are in their "middle age". Even the best designed and maintained pipeline will become defective as it progresses through its design life. Therefore, operators need to be aware of the effect these defects will have on their pipeline, and — more importantly — be able to assess their significance in terms of the continuing integrity of the pipeline.

This course will learn participants how increasing use of high-technology maintenance is helping pipeline owners to assess the condition of their lines, and if these modern maintenance methods are combined with modern defect-assessment methods, they can provide a very powerful, and cost-effective, tool. This course will present the latest inspection, defect-assessment and maintenance methods to pipeline engineers and managers. Also, this course will also provide the participants with an in-depth understanding of the most popular Codes and Standards used in piping and pipelines inspection, maintenance and integrity assessment.

COURSE GOAL

To enhance the participants' knowledge, skills, and attitudes necessary to develop and manage a piping system inspection, integrity assessment and rehabilitation program to tackle the new integrity challenges.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Explain all the information covered in the API 570 'Body of Knowledge'.
- Determine the major threats and risks to the integrity of their system.
- Develop plans to address the identified threats.
- Conduct appropriate inspections to determine the condition of the system.
- Assess the results of the inspections.
- Control and Maintenance.

WHO SHOULD ATTEND

- Engineers with long field experience with the following disciplines: Pipeline Operations, Pipeline Inspection, Integrity Engineers.

- Engineering Consultants.
- Maintenance Personnel.
- Inspectors.
- Inspection personnel.
- Trainee Engineers.

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Introduction to Basic Pipeline Engineering Principles

- Importance of pipeline
- Basic pipeline design principles
- Stresses in pipelines
- Routing of pipelines
- Basic pipeline operating parameters
- Operating & Design Pressure

2. Introduction to Pipeline Defects - Why Pipelines Fail

- How safe are pipelines?
- How often do they fail?
- What causes pipelines to fail?
- Pipeline risks
- History of pipeline defect assessment

3. Integrity for Sustained and Occasional loads

- Layout
- Support
- Temperature Effects
- Vibration Effects
- Pressure Effects

4. Codes and Standards

- ASME Codes and Standards
- API Standards
- Other standards: NACE, etc..

5. Pipeline / System Defect or Failure Relationships

- Why pipelines and systems fail? Material, manufacture, fabrication, operational, environmental factors
- Identifying cause assessing the damage/failure
- Fundamental failure relationships

6. Principles and Practice of Data Collection and Management

- Pipeline information database structures
- Manufacturing defects
- Construction defects
- Environmentally induced failures (SCC)
- Failure case studies analysis of causes of failures
- Failure modes and how pipelines fail (ductile/brittle fracture)
- Introduction to external and internal corrosion (including microbiological induced corrosion)
- Case studies of pump components, pipes, etc.

7. Piping System Other Auxiliaries and Equipment and Cause of Failure

- Inspection and testing practices – sec.5
- Selection of piping and fittings-flanges, elbows, joints
- Piping codes and standards – B 31
- Designing of piping system
- Material of construction – physical properties
- Pipe thickness calculations.
- Engineering of piping – B 31.3
- Pressure drop.
- Valves.
- Pumps.
- Compressors.
- Heat exchangers.
- Heaters.
- Expansion joints, orifice, strainers.
- Pipe supports.
- Routing: Above ground, below and in trenches.
- Welding of CS and alloy steel.
- Welding of austenite steels.

- Conversion table.
- Pressure testing.
- Field velocities.

8. Defect Assessment - review the assessment methods which are applicable to pipelines and systems

- Corrosion assessment methods (ASME B31.G).
- Methods to assess manufacturing metal loss defects.
- Methods to assess dents.
- Methods to assess gouges and dent/gouge combinations.
- Methods to assess cracks (BS 7910, API 579, In-sec).
- Methods to assess laminations (API 579).
- Using inspection data to carry out integrity assessments.
- On-line measurements-coupons.

9. Repair and Remediation - the Preparation Procedures for Repairs and restoration.

- Grind repairs.
- Local weld repairs.
- Sleeving, lining and cladding.
- Cold weld repair using epoxy products materials handled.

10. Setting offshore Pipeline Intelligent Pig Inspection Levels

- Pigs - where they came from and what they can do.
- Basic theory.
- Magnetic, ultrasonic pigs - their accuracy and limitations.
- What pigs can detect .
- What operators want to detect .
- Setting intelligent pig inspection levels.

11. Risk and Integrity Management and Analysis.

- What is risk and risk analysis?
- Risk Assessment & Risk Management.
- Risk management methods - API and ASME.
- Baseline and direct assessment - discussion item.
- Integrity Management Programs.
- Prioritization schemes.